

THERE IS CLAIMED:

1. A safety device for a battery of electrical storage cells composed of modules connected in series each including a storage cell or a group of storage cells and in particular a group of storage cells connected in parallel, said device including at least one individual circuit for individually short circuiting a module if it should fail and maintaining permanently the electrical continuity between the other modules connected in series with it in said battery, wherein said individual circuit includes a first shunt circuit that is connected to the two end terminals of a module in said battery and includes an electrical energy consuming member in series with a switching member for applying a shunt to the terminals of said module via said consuming member if the voltage at the terminals of said module is greater than a particular upper voltage threshold value, said circuit directly short circuiting the terminals of said module if the voltage at said terminals of said module falls below a particular lower voltage threshold value.
2. The device claimed in claim 1 wherein said circuit short circuits internally the module to whose terminals it is connected via a first shunt circuit by extending the discharging of said module via said first shunt circuit until a reversal of polarity which corresponds to a negative threshold of the voltage at the terminals of the module occurs immediately discharging of the battery commences.
3. The device claimed in claim 1 wherein a second shunt circuit is connected to the two end terminals of a module of the battery in parallel with the first shunt circuit associated with said module and includes a switching member for short circuiting the terminals of the module directly if the voltage at the terminals of the module is below a particular lower voltage threshold value.
4. The device claimed in claim 1 wherein one individual circuit is provided for each battery module.
5. The device claimed in claim 1 wherein said electrical energy consuming member of an individual circuit is an energy dissipating resistor.
6. The device claimed in claim 3 wherein each individual circuit includes at least one trigger device which is responsive to the voltage present at said terminals of said module with which said individual circuit is associated, for at least one of said shunt circuits of said individual circuit, and which controls switching of said switching member of said individual circuit to a conducting state from a predetermined voltage threshold value.
7. The device claimed in claim 1 wherein at least one switching member of a shunt

8. The device claimed in claim 1 wherein said switching member of said first shunt circuit of an individual circuit provided for a module is switched on if the voltage measured for an individual circuit at said terminals of a module exceeds said particular upper voltage threshold value, and said switching member of said second shunt circuit of said individual circuit is turned on immediately said measured voltage falls below said particular lower voltage threshold value.
9. A battery of electrical storage cells made up of modules connected in series and each including a storage cell or a group of storage cells and in particular a group of storage cells connected in parallel, said battery including a safety device including at least one individual circuit for individually short circuiting a module if it should fail and maintaining permanently the electrical continuity between the other modules connected in series with it in said battery, wherein said individual circuit includes a first shunt circuit that is connected to the two end terminals of a module in said battery and includes an electrical energy consuming member in series with a switching member for applying a shunt to the terminals of said module via said consuming member if the voltage at the terminals of said module is greater than a particular upper voltage threshold value, said circuit directly short circuiting the terminals of said module if the voltage at said terminals of said module falls below a particular lower voltage threshold value.
10. The device claimed in claim 9 wherein said circuit short circuits internally the module to whose terminals it is connected via a first shunt circuit by extending the discharging of said module via said first shunt circuit until a reversal of polarity which corresponds to a negative threshold of the voltage at the terminals of the module occurs immediately discharging of the battery commences.
11. The device claimed in claim 9 wherein a second shunt circuit is connected to the two end terminals of a module of the battery in parallel with the first shunt circuit associated with said module and includes a switching member for short circuiting the terminals of the module directly if the voltage at the terminals of the module is below a particular lower voltage threshold value.
12. The device claimed in claim 9 wherein one individual circuit is provided for each battery module.
13. The device claimed in claim 9 wherein said electrical energy consuming member

of an individual circuit is an energy dissipating resistor.

14. The device claimed in claim 11 wherein each individual circuit includes at least one trigger device which is responsive to the voltage present at said terminals of said module with which said individual circuit is associated, for at least one of said shunt circuits of said individual circuit, and which controls switching of said switching member of said individual circuit to a conducting state from a predetermined voltage threshold value.
15. The device claimed in claim 9 wherein at least one switching member of a shunt circuit of an individual circuit is controlled by an external programmed control unit in accordance with the voltage at said terminals of said module.
16. The device claimed in claim 9 wherein said switching member of said first shunt circuit of an individual circuit provided for a module is switched on if the voltage measured for an individual circuit at said terminals of a module exceeds said particular upper voltage threshold value, and said switching member of said second shunt circuit of said individual circuit is turned on immediately said measured voltage falls below said particular lower voltage threshold value.